



MACHAKOS UNIVERSITY

University Examinations 2020/2021 Academic Year

DEPARTMENT OF MATHEMATICS AND STATISTICS

UNIVERSITY EXAMINATION 2019/2020

SMA 160: INTRODUCTION TO PROBABILITY AND STATISTICS

DATE: JAN-APRIL 2020 SERIES

TIME: 2 HOURS

INSTRUCTIONS:

- 1) Answer Question ONE and any other TWO questions.
- 2) Mobile phones and any written material are prohibited in the examination room.
- 3) No writing should be done on this question paper. Any rough work should be done at the back of the answer booklet and canceled.
- 4) All answer booklets should be handed in at the end of the exam whether used or not.
- 5) Programmable calculators are prohibited

QUESTION ONE (COMPULSORY – 30 MARKS)

- (a) Define the following terms as used in statistics.
- (i) Range (1 mark)
 - (ii) Coefficient of correlation (1 mark)
- (b) State four classes of classification (4 marks)
- (c) Distinguish between a histogram and a frequency polygon (2 marks)
- (d) If the probability that a student A will fail a certain statistics examination is 0.3, the probability that student B will fail the examination is 0.15, and the probability that both students A and B will fail the examination is 0.08. What is the probability that
- (i) At least one of these two students will fail the examination? (3 marks)
 - (ii) Neither student A nor student B will fail the examination? (3 marks)
- (e) The following data shows the marks obtained by 49 students in a class.

Marks	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
Number of students	5	6	15	10	5	4	2	2

- (a) Calculate the
- (i) Median (4 marks)
 - (ii) Arithmetic mean (2 marks)
 - (iii) Variance (4 marks)
 - (iv) Mode (4 marks)
- (f) Compute the harmonic mean of the following numbers 3,9,27. (2 marks)

QUESTION TWO (20 MARKS)

The marks obtained by 80 students are given below

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	3	9	15	30	18	5

- (a) Compute the
- (i) Lower quartile (3 marks)
 - (ii) Upper quartile (3 marks)
 - (iii) Quartile deviation (2 marks)
- (b) Draw a cumulative frequency curve hence use it to estimate
- (i) 4th decile (3 marks)

- (ii) 40th percentile (3 marks)
- (c) State one merit and one demerit of arithmetic mean (2 marks)

QUESTION THREE (20 MARKS)

- (a) Find the mean deviation of the following set of numbers (5 marks)
20, 30, 60, 80, 110.

- (b) The following marks were obtained in a statistics test in a class of 25 students

Marks	0-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100
Frequency	0	3	7	7	5	2	1	0

Calculate

- (i) Mean (4 marks)
- (ii) The standard deviation (4 marks)
- (iii) The variance (2 marks)
- (c) An analysis of monthly wages paid to the workers in two firms A and B belonging to the same industry gives the following results.

	Firm A	Firm B
Number of workers	500	600
Average monthly wage	£186	£175
Variance distribution of wages	81	100

Which firm has a large wage bill? (5 marks)

QUESTION FOUR (20 MARKS)

In a mock examination, the marks of six candidates in the mathematics papers were as follows,

	1	2	3	4	5	6
Paper I (x)	47	44	42	51	65	63
Paper II (y)	50	43	43	35	51	48

- (a) Obtain the least squares Regression line connecting paper I and paper II (12 marks)
- (b) Calculate the correlation coefficient between paper I and paper II (8 marks)

QUESTION FIVE (20 MARKS)

- (a) Define the following terms
- (i) Probability (1 mark)
- (ii) Sample space (1 mark)
- (b) A bag contains 5 red balls and 3 black balls. If 3 balls are drawn without replacement, what is probability that;
- (i) No black balls will be selected? (2 marks)
- (ii) Exactly one red ball will be selected? (3 marks)
- (iii) At least one red ball will be selected? (3 marks)
- (c) Machine A_1 produces 50%, Machine A_2 30% then the remaining by machine A_3 , in a factory out of the items by these machines 3%, 4% and 5% respectively are defective. An item produced in this factory (selected randomly) was found to be defective. Find the probability that this item was produced by machine;
- (i) A_1 (4 marks)

(ii) A_2

(3 marks)

(iii) A_3

(3 marks)